

TO: Secretary Wade Crowfoot, the California Natural Resources Agency

FROM: The PPIC Water Policy Center

DATE: September 9, 2019

SUBJECT: Priorities for building a water resilience portfolio

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Thank you for the opportunity to submit comments to inform the administration's preparation of a water resilience portfolio. These comments outline key water policy priorities for the state in light of a changing climate, and ways to improve integration across state agencies to implement these priorities. We begin by describing how key changes will affect water management across the state, and offer some guiding principles that will be key to successful adaptation. We then discuss the state's role in addressing two overarching categories for reform that are particular areas of concern for the administration: modernizing the water grid, and protecting freshwater ecosystems. Following a brief conclusion, we provide a list of relevant resources from recent PPIC Water Policy Center work.

### A Changing Water Landscape

California faces a host of changes that will affect water management in multiple ways. It will take a concerted effort to plan, prepare, and respond to these changes. But because water management is so central to all aspects of life in California, adapting both practice and infrastructure is essential to maintain the state's vibrant economy, protect public health, and improve conditions for at-risk ecosystems and species. Key changes include:

- **Climate change:** Five climate pressures will seriously impact the state's water management, and are already underway. Warmer temperatures, a shrinking snowpack, shorter and more intense wet seasons, rising sea level, and more volatile precipitation—with wetter wet years and drier dry years—are stressing the state's water management system. Recent climate projections indicate that the pace of change will increase. These pressures make it harder to simultaneously store water for droughts, manage flood risk, and protect freshwater ecosystems. Two particularly complex challenges are anticipating and preparing for droughts of the future, and extreme flooding.
- **Population growth:** By 2050, California's population is projected to reach 50 million (up from nearly 40 million now). Inland areas are expected to grow the fastest, which will bring

additional pressure to managing groundwater supplies sustainably. The recent past offers some hope, however: urban water use fell over the past two decades, despite population growth.

- **Technological and regulatory changes:** California has long been a leader in water system innovation. Agencies are investing in new tools to manage groundwater, develop supplies, and clean up contamination, to name a few. And continued innovation will create new possibilities for the water sector. Regulatory changes can limit urban and farm access to some water supplies, but can also present opportunities, such as allowing broader uses of recycled water and more streamlined permitting.
- **Evolving relationships between state, federal, and local governments:** California's relationship with the federal government is an ongoing factor in forest management, water supply, dam management, ecosystem health, and many other major issues. And for California's many local agencies, which make most frontline management decisions, an ongoing priority is to strengthen regional partnerships.
- **Achieving groundwater sustainability:** Major changes in water and land management will be required to comply with the Sustainable Groundwater Management Act (SGMA), the state law requiring local water users to bring groundwater use to sustainable levels by the early 2040s. The biggest impacts will be on California agriculture, and some permanent idling of farmland in the San Joaquin Valley is likely.

We believe the following four principles will be key to ensure that efforts to prepare for and respond to these changes succeed:

- **Flexibility** of institutions, rules, infrastructure, and water demand to help manage increased volatility and build resilience to changing conditions.
- **Incentives** to encourage and enable local agencies and individuals to implement smarter, more flexible management systems.
- **Alignment** of objectives and regulatory approaches across agencies, to make it easier to do things like trade, recharge, and restore forests and freshwater ecosystems.
- **Encouraging multiple benefits:** options that simultaneously tackle multiple issues—such as flood protection, recharge, and habitat—can broaden cooperation and leverage more sources of funding.

### **The State's Role in Building Water Sector Resilience**

Although California's water management challenges will affect many different actors, here we will specifically focus on ways the state can play a leading role—either because it has primary responsibility or because it can incentivize a particular change—in modernizing the water grid and protecting freshwater ecosystems.

### *Modernizing the Water Grid*

This section responds to your agency's questions related to managing water in a changing climate:

- What state actions work best to foster regional water resilience?
- How can we help create a more flexible and adaptable water grid?
- What investments, data, and incentives would enhance groundwater recharge?
- How can the state improve water trading to reduce scarcity during droughts?

We believe it is helpful to think about solutions to these questions in the context of modernizing California's water "grid"—the network of reservoirs, aquifers, rivers, and water conveyance and flood control infrastructure that connects much of the state. Although this system was built for a climate that no longer exists, it is the most important asset the state has for addressing changing conditions, both statewide and within regions. A modernized water grid, coupled with more flexible management, can reduce the cost of future droughts, improve how we manage flood risk, and help protect freshwater ecosystems. The state has made important advances in assessing and improving its water supply infrastructure, but it still lacks a comprehensive program to address storage, conveyance, and operational challenges by mid-century. Seeking multiple benefits from infrastructure investments is key (for example, setting levees back to reduce flood risk, promote groundwater recharge, and improve habitat for native fish and birds). Top priorities include:

- **Improve conveyance and storage capacity.** California's aging water infrastructure needs an overhaul to improve its ability to adapt to change. Priorities include improving underground storage and expanding conveyance to support water trading and sharing programs. Wherever feasible, investments in repairs and rehabilitation should go to projects that provide multiple benefits and increase resilience to drought and climate volatility. The California Department of Water Resources—in collaboration with key federal agencies (US Bureau of Reclamation and US Army Corps of Engineers)—should lead a comprehensive, integrated drought and flood infrastructure assessment and rehabilitation effort. Regional coordination and cooperation will be needed to develop and fund new water infrastructure, but the state can play a role by providing incentives, planning assistance and, where appropriate, financial help.
- **Modernize and integrate operations.** Adapting to a more volatile climate will require increasing the operational flexibility of storage and conveyance facilities, and ensuring they work together as an integrated system. For instance, moving more water out of surface reservoirs and into aquifers in the fall can free up room in reservoirs to capture winter and spring storms. More accurate forecasts can help managers decide whether they need to release water to protect downstream areas from flooding, transfer water to groundwater basins, or keep water in reservoirs for later use. And a well-connected grid can allow for trading and groundwater banking to improve the economic efficiency of water use. While a significant part of this effort will take place at the local and regional levels, there are also

many opportunities to integrate local water system operations at a broader scale. The state and federal governments should take the lead on system integration. Finally, the state (especially DWR and the State Water Board) should lead the modernization of water accounting systems to make information on water use and availability more transparent.

- **Plan for bigger floods.** To reduce risks from more volatile precipitation, California must go beyond infrastructure improvements and emphasize non-structural measures, such as flood-smart land use planning, flood insurance, flood-proofing buildings, and emergency preparation. Local hazard mitigation plan requirements should include these approaches and anticipate future conditions based on best available science. Some multipurpose reservoirs will need to be re-operated, setting aside more space to capture larger floods. Two strategies can help take the pressure off these reservoirs: moving reservoir water into aquifers before flood season, and restoring natural floodplains so that they can slow and convey larger flows. Both approaches also provide water supply and ecosystem benefits. Giving rivers more room to flood may require compensation for adjacent landowners. The state can play an important role in improving flood preparation by helping plan and fund vital infrastructure, setting standards for non-structural measures such as flood proofing, and providing incentives for multi-benefit flood projects. The state should consider developing its own flood insurance program to supplant the National Flood Insurance Program, which is approaching insolvency, and which offers a poor return on the dollar to California.
- **Promote groundwater recharge:** Groundwater is a vital drought reserve, and many California basins have considerable potential to affordably store more water. In the past, the lack of active management—including tracking groundwater use—has been an obstacle to these investments, but SGMA provides opportunities to make this shift. In addition to expanding dedicated recharge areas, some farmers and irrigation districts are experimenting with new methods, such as flooding suitable cropland during the winter months. But the rules governing diversion of water from rivers are unclear, and permitting needs to be more expeditious to take advantage of high flows. The State Water Board should develop a straightforward, expeditious process to enable water users to capture high-flow surface water when it is available. Beyond the legal aspects of establishing new rights for recharged water, the state should also develop a simple, rapid way to determine when flows on local rivers exceed water required for the environment and downstream users. Water managers and growers also need guidelines for implementing on-farm recharge that is consistent with water quality rules. Better accounting is also needed to incentivize more widespread groundwater recharge on farms, to encourage multi-basin partnerships for recharge, and to inform decisions on new investments. The state could support this effort by developing statewide groundwater accounting standards on matters such as units and frequency of measurement to enable comparability, auditability, and consistent analysis and management—and taking steps to ensure such standards are used.
- **Streamline trading and banking:** Limitations in conveyance infrastructure are compounded by difficulties in securing permits for trades and off-site groundwater banking. Both tools are necessary

to make efficient use of storage and conveyance infrastructure and to maximize the capture and storage of water. While it is important to ensure that trading and banking do not harm other water users or the environment, it is difficult to receive approvals for these activities in a timely manner. New administrative approaches are needed to facilitate these actions through simplified environmental reviews and pre-approved transfers. The State Water Board should lead a comprehensive update and streamlining of rules governing trading and banking of water. DWR could start preapproving transfers that are consistent with meeting goals in groundwater sustainability plans. And as owners and operators of the two largest water projects in the valley, DWR (for the State Water Project) and the US Bureau of Reclamation (for the Central Valley Project) can smooth the way for transfers by working with the State Water Board and local agencies to consolidate places of use assigned to different water rights, to provide blanket permitting for regional water sharing. A useful model is the temporary consolidation of place of use for the CVP and the SWP in the San Joaquin Valley during the last two droughts. These agencies can also facilitate the development of off-site groundwater banks; local agencies in Kern County provide a model for how this can work.

### *Protecting Freshwater Ecosystems*

This section responds to your agency's questions on helping ecosystems adapt:

- How can California better incorporate environmental protection into water management?
- How can the state move from single-species management to ecosystem-based management?
- What science, governance and funding structures are needed to support ecosystem-based management?
- Should state environmental laws be updated in light of climate change and if so, how?

California's freshwater ecosystems present special challenges. The state's native biodiversity continues to decline, despite decades of effort to improve conditions. Problems encountered during the 2012–16 drought—high water temperatures, low flows, insufficient cold water stored in reservoirs, and degraded habitat—will all likely worsen as droughts become more intense. Management of cold-water-dependent species—including salmon, trout, and some resident fishes such as Delta smelt—will continue to pose a significant challenge for water managers and regulators as conditions warm. Changing habitat conditions could make it impossible for some species of fish, amphibians, and birds to remain viable in their historic locations. Rising temperatures, along with nutrient-polluted runoff, are also behind the rise in harmful algal blooms, which affect water supply, recreation, and species. And conflicts between the need to protect native species and land and water management activities are likely to increase.

California needs to change its regulatory and management policies. The historic approach of setting minimum instream flow and water quality standards and focusing narrowly on protecting species listed

under federal and state Endangered Species Acts is not working. A new approach is needed that recognizes the multiple social and economic benefits from healthy freshwater ecosystems and helps them adapt to changing conditions. The goal should be to improve ecosystem conditions for nature and people. This “healthy ecosystem” approach would reduce conflict—and reduce cost and uncertainty for water users—while also creating a higher return on resources allocated to manage the environment. To implement this shift, the following reforms are needed:

- **Adopt new management frameworks.** Comprehensive programs are needed to implement ecosystem-based management, as well as changes in approach. Rather than focusing on just protecting listed species in order to acquire Clean Water Act and Endangered Species Act permits, the goal is to define and manage toward a healthy ecosystem. This includes clearly defining who benefits from this ecosystem, setting metrics and performance measures, developing robust science and governance programs, and securing reliable funding for management. The state also should encourage programs that provide multiple benefits. The Sacramento Valley salmon restoration program—which facilitates the use of the region’s lands and waters for agriculture, waterfowl habitat, salmon migration, and flood control—is a good example. In some areas, retired agricultural lands in the San Joaquin Valley also may be managed to provide multiple benefits, including floodplain restoration, fish and wildlife habitat, and groundwater recharge.
- **Use multiple management tools together, including ecosystem water budgets.** Traditional efforts to manage flow and water quality by setting standards will not be sufficient as California changes. One of the more important tools that should be adopted is ecosystem water budgets—blocks of water set aside for the environment that can be managed flexibly. These budgets would function like a water right, and could be stored, traded, and implemented strategically to improve ecological conditions. To be most effective, flows using these budgets need to be paired with improvements in structural habitat and water quality. Because California hosts so many non-native species and many native species are in trouble, the state will also have to redouble its efforts at direct management, including invasive species eradication, hatchery reforms, and establishing new populations of species outside of their historic range. Finally, it is important that all of these tools be deployed at the proper scale. In many parts of the state the best scale is the watershed.
- **Promote sustainable watershed management plans.** We believe that a shift toward ecosystem-based management could be accomplished without altering water quality and endangered species laws. However, the governor and the legislature should examine ways to incentivize the development of sustainable watershed management plans that incorporate the principles outlined above. One promising approach would be to support efforts to develop watershed plans with technical and financial assistance, as well as directives to state agencies to participate in and support the process. These plans would set goals and objectives for the ecosystem and define actions and responsibilities for meeting them. Critically, these plans are an opportunity to align multiple state and federal permitting requirements under a unified program. Ideally, these plans would result in voluntary agreements that can be adopted by regulatory agencies, making them binding and broadly

enforceable. Where possible, federal Habitat Conservation Plans and state Natural Communities Conservation Plans should be incorporated within the overall watershed plans.

- **Consolidate information on water availability and ecological indicators.** Effective ecosystem-based management will require better information on ecosystem conditions and performance. California's water managers have an urgent need for data platforms that bring together information on water availability, water quality, and ecological indicators such as locations of protected species. As a biodiversity hotspot, California should lead the way in using state-of-the-art information to tackle its tough environmental water management challenges. Tracking information on the location of waterbirds helped determine when to use scarce water supplies in Central Valley wetlands during the latest drought. More needs to be done, especially to manage temperature-sensitive salmon and steelhead.

## Conclusion

Managing water—whether too much or too little—is at the forefront of climate change adaptation in California. Tackling these complex challenges with an integrated water resilience portfolio is a bold step, and one that has the potential to make California a leader in climate adaptation. The effort will require exceptional cooperation across agency silos, greater public outreach, and targeting of state resources toward the goals outlined here. The state has already shown leadership in developing a portfolio approach; another crucial step will be to build momentum and trust to ensure its successful implementation.

## Resources

The following publications from the PPIC Water Policy Center provide more information on these issues:

### *The Water Grid*

[Accounting for California's Water](#) (2016)

[Building Drought Resilience in California's Cities and Suburbs](#) (2017)

[Managing Drought in a Changing Climate: Four Essential Reforms](#) (2018)

[Managing Wastewater in a Changing Climate](#) (2019)

[Replenishing Groundwater in the San Joaquin Valley](#) (2018)

[Water and the Future of the San Joaquin Valley](#) (2019)

[California's Water Market](#) (2019)

[California's Water Grid](#) (2019)

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[Climate Change and California's Water](#) (2019)

[Dams in California](#) (2019)

[Groundwater Recharge](#) (2019)

*Ecosystem Management*

[Allocating California's Water: Directions for Reform](#) (2016)

[Managing Water for the Environment During Drought: Lessons from Victoria, Australia](#) (2016)

[A New Approach to Accounting for Environmental Water: Insights from the Sacramento–San Joaquin Delta](#) (2017)

[Managing California's Freshwater Ecosystems: Lessons from the 2012–16 Drought](#) (2017)

[Commentary: Delta Interests Should Seize the Opportunity to Cease Water Fights](#) (2019)